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High Level Waste Division

PMP Supplement
to HLW System Plan Rev. 13 (U)

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Appendixes

Executive Summary

Purpose

The purpose of this supplement to the High Level Waste (HLW) System Plan, Revision 13 (HLW-2002-00025) is to document the HLW production parameters consistent with the SRS Environmental Management Program Performance Management Plan (WSRC-RP-2002-00245, Rev 3), referred herein as the PMP.

The HLW System Plan, Revision 13 was issued in March 2002 to:

- discuss the salt processing strategy in detail and model three cases showing the sensitivity of varying startup dates and processing rates for salt processing;
- update the status of key commitments of System Plan Revision 12 Base and Stretch Cases (these two cases represent the minimum performance and the contract performance baseline in the fiscal year FY01-06 Site Contract);
- update the status of key issues, assumptions and vulnerabilities in the HLW system;
- summarize major scope changes, such as the planned receipt of Americium-Curium solution into the tank farm from F-Canyon.

Since the issuance of Revision 13, major cleanup reform initiatives have been proposed to accelerate completion of the Site's environmental management missions. The details of the accelerated cleanup initiatives are documented in the PMP issued August 2002. The cleanup acceleration initiatives from Revision 13 to the PMP can be summarized as follows:

- Expedite sludge processing
- Expedite salt processing
- Expedite risk-based tank and facility closure
- Expedite canister shipment to the Federal Repository

To ensure HLW facilities are working in alignment with these initiatives, this supplement to Revision 13 is provided to document HLW production parameters. Status of progress against the FY01-06 contract baseline and additional PMP implementation status and detail will be included in Revision 14 of the HLW System Plan when it is issued in 2003.

Introduction

The HLW System Plan, known herein as the Plan, documents the operating strategy of the HLW system at Savannah River Site (SRS) to receive, treat and dispose of approximately 37 million gallons of liquid, high-level radioactive waste. This waste is stored, on an interim basis, in 49 underground tanks. To date, thirteen revisions of the Plan have been issued each giving an updated status of the HLW operating strategy at the time of issue. Broadly speaking, HLW waste can be characterized as being either *salt* waste (soluble in the liquid) or *sludge* waste (insoluble). SRS has been immobilizing the sludge portion since 1996. The HLW System has already removed and vitrified over 1,300 canisters of an estimated total 5,100 canisters of sludge. The present integrated salt strategy includes low curie salt processing, actinide removal, and processing via caustic-side solvent extraction (CSSX).

This supplement of the Plan documents the production parameters consistent with the PMP. The PMP provides for the majority of the salt waste to be processed through alternative salt processing strategies: low curie salt processing and actinide removal.

SRS Cleanup Reform Vision

The SRS Cleanup Reform Vision is to accelerate completion of the Site's Environmental Management (EM) missions. The PMP outlines specific actions that the Department of Energy (DOE) is taking to accelerate the SRS cleanup program to 2030, while targeting a more aggressive cleanup date of 2025. The Vision applies innovations to accelerate cleanup, reduce risk, reduce the life cycle costs, and enhance homeland security.

Accelerated cleanup will be achieved by implementing the following three strategies:

- accelerating the mitigation and elimination of risks through: (1) treatment and disposition of nuclear materials and waste, and (2) addressing hazards of contaminated sites and excess facilities;

- reducing the high carrying costs associated with maintaining large, complex nuclear facilities in a safe condition through accelerated deactivation and, where warranted, complete decommissioning; and
- driving down the cost of doing business through a comprehensive review of activities, requirements and procedures for value added against a safe mission essential standard and aggressive pursuit of closure for facilities and operations with near-term completions.

Fundamentally, the SRS Vision represents a shift from risk management to risk reduction/risk elimination. This shift will require major program reconfigurations and substantial changes in how the site does work—within both the DOE and contractor organizations — with special emphasis on identifying closure projects with risk-appropriate requirements.

Fourteen strategic initiatives have been identified that lead to the successful acceleration of the SRS EM cleanup program. These initiatives are in the areas of HLW, nuclear materials, solid waste, environmental restoration, facilities deactivation and decommissioning and security. The scope, cost, schedule, facility end state at completion (if appropriate), assumptions to achieve success, and success measures for each initiative are detailed in the PMP.

HLW Initiatives to Meet the Vision

Two of the fourteen initiatives are specific to HLW and are incorporated in this Plan supplement. A brief summary description of the two HLW initiatives is provided below. A more detailed description of the scope, benefits and prerequisites to success for each initiative is included in the PMP.

<u>WM-1, Expedited HLW Processing</u> HLW processing is completed eight years earlier than scheduled in Revision 13 of the Plan (2019 versus 2027). This will save $5.4 billion for SRS and an additional $1 billion for the Department of Energy (DOE) by segregating HLW into four components and tailoring the treatment to each of these components. These components are:

- Sludge (which contains the majority of the long-lived radionuclides).
- Low curie salt – the low curie path will send the salt solution directly to Saltstone if it meets the Waste Acceptance Criteria (WAC) requirements.
- Low curie salt with higher actinide content – the actinide removal process (ARP) will send a decontaminated salt stream to Saltstone and a monosodium titanate (MST) actinide stream to the Defense Waste Processing Facility (DWPF).
- High curie salt – the high curie salt will be processed in a CSSX Salt Waste Processing Facility (SWPF). The SWPF will send a decontaminated salt stream to Saltstone, an MST actinide stream to DWPF, and an acidified cesium stream to DWPF.

The segregation of these streams allows less costly treatment methods to be used on waste that contains lower levels of radioactivity and shorter lived radionuclides. This initiative focuses on implementing expedited treatment methods that ensure the fastest risk reduction, while meeting the performance requirements and protecting human health and the environment.

This initiative also classifies the HLW tanks as “closure facilities” to appropriately define the requirements to manage these tanks consistent with their use (waste storage) and end state.

<u>WM-2, Expedited Risk-Based Tank and Facility Closure</u> HLW tanks and other facilities slated for closure are transitioned to a risk-based approach that reduces the cost of the HLW program by $0.7 billion.

The precepts of the previous tank closure program were to remove as much material from the tank as technically and economically practicable and then close the tank with grout as soon as it was empty. Some actions towards transitioning tanks to a closed state can be taken without revising some DOE Orders. However, modifications to the DOE Order 435.1 implementation guidelines, particularly in the area concerning Intruder Analysis criteria, will allow a more appropriate risk reduction approach to be taken. These modifications allow using new performance assessment requirements to determine the heel removal endpoint for each tank.

The DOE Order implementation guidance modifications may also support a broader range of materials that could be used to close tanks such as grout containing depleted uranium or grout containing some of the short half life processed salt materials.

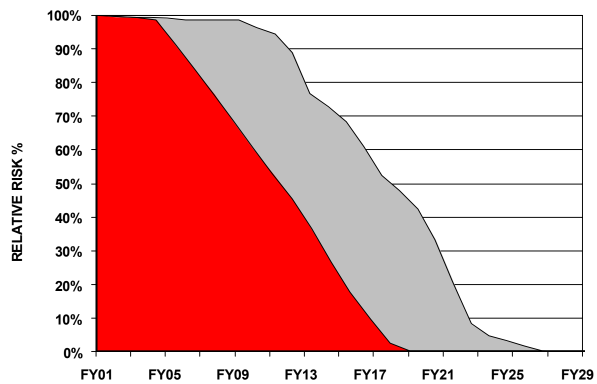
Even without successful DOE Order modification, the program can be modified to schedule tank closure more appropriately for risk reduction. This approach allows for large groups of tanks to be emptied, and once emptied, the tanks will be closed in a "batch" fashion, after the highest risk reduction activities have been completed at SRS. Grouping tanks for closure significantly reduces the cost of completing the tank closures. This concept of risk-based tank closures enhances the protection of human health and the environment.

1. PMP Modeling Results

This supplement documents the operating strategy of the HLW system to receive, treat and dispose of high-level radioactive waste in support of the cleanup reform vision defined in the PMP. It involves safely storing high-level waste in underground storage tanks, removing, pre-treating, and vitrifying this high-level waste; and storing the vitrified waste until it can be permanently dispositioned at a federal repository. As of October 1, 2002, 1,337 canisters containing vitrified waste were produced. Two waste tanks were closed by the end of FY98 and bulk waste removal was completed on two of the high-risk tanks (Tank 8 and 19). The tank farms have approximately 37 million gallons of waste containing over 400 million curies of radioactivity to be disposed of over the next 20 years.

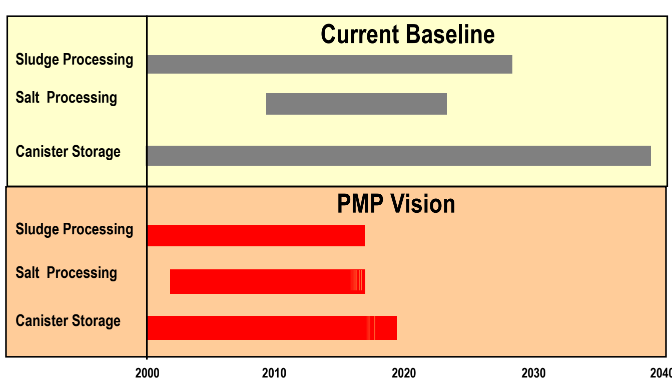
1.1 *System Plan Results*

Implementation of the HLW initiatives in the PMP substantially expedites the Site's overall risk reduction profile as shown in the graphic that reflects percentage of remaining curies of waste in the tank farm over time. Risks associated with the storage of HLW are eliminated by 2019, eight years earlier than forecast in



Revision 13, thereby providing substantial homeland security improvements for the Site.

Acceleration of HLW processing as outlined in the PMP expedites all of the HLW schedules. These improvements range from a seven-year improvement in the start of Salt Processing to a 20-year improvement in all HLW leaving the Site.



Accelerating HLW processing provides a substantially improved program, and delivers that program in a manner that reduces over $5.4 billion of SRS lifecycle costs to the taxpayer. When combined with the estimated savings from expediting risk-based tank and facility closures of $0.7 billion, a total lifecycle savings of $6.1 billion is realized.

Implementing the PMP initiatives also provides an additional benefit of producing approximately 1,000 fewer canisters of glass because more waste can be placed in a canister than before. This results in an additional DOE Complex saving of up to $1 billion from lower repository costs.

A review of the modeling results also reveals that there is adequate tank farm space to support the processing commitments based upon assumptions used for HLW system modeling. The challenge will be to *maintain* operations of the HLW system (evaporators, transfer systems, and other associated infrastructure) so that existing stored backlog waste and future influent streams can be efficiently processed to maximize the space recovery. Obviously, the success of the low curie and ARP salt processing alternatives are crucial to the success for accelerating the end of HLW processing and the associated closure of facilities.

1.2 *Key Production Parameters and Milestones*

Key production parameters and key milestone dates required to remove waste from storage, process it into glass or saltstone grout, and close HLW facilities shown in Tables 2-A and 2-B on the next pages, respectively.

Table 2–A Key Production Parameters

	Rev 12			Rev 13				
Production Parameters	**Base Case**	**Stretch Case**	**Super Stretch Case**	**Case 1**	**Case 2**	**Case 3**	**PMP**	
Total Number of Canisters Produced	5,914	5,914	5,871	6,041	6,041	6,120	5,060	
Date when salt processing complete	FY24	FY22	FY22	FY27	FY27	FY28	FY19	
Date when sludge processing complete	FY29	FY27	FY23	FY27	FY27	FY24	FY19	
DWPF Sludge Production							Dis-crete	Equi-valent[1]
• FY01	163	220	255	227(Act)	227(Act)	227(Act)	227(Act)	
• FY02	111	150	150	150	150	150	160 (Act)	163 (Act)
• FY03	155	210	240	210	210	240	230	280
• FY04	163	220	240	220	220	240	230	280
• FY05	111	150	150	150	150	150	230	280
• FY06	147	200	115	193	193	143	230	280
• FY07	200	Outage	200	Outage	Outage	200	230	280
• FY08	107	Outage	200	Outage	Outage	150	230	280
• FY09	Outage	Outage	200	Outage	Outage	230	230	280
• FY10	150	100	150	200	150	230	230	280
• FY11	200	230	250	200	230	230	230	280
• FY12	200	230	250	150	230	230	230	280
• FY13 to End of Sludge Processing	200	230	250	230	230	230	230	280
• Salt-only Cans at End of Program	0	0	0	0	0	79		
Salt Processing Information								
• Low Curie and Actinide Success				No	Yes	Yes	Yes	
• Volume of Saltcake Processed via Alternative Strategies				n/a	1.5 Mgal	3.0 Mgal	18Mgal	
• Years of Alternative Saltcake Processing				n/a	FY03-05	FY03-07	FY03-17	
Date Salt Waste Processing Facility Becomes Operational	FY10	FY10	FY10	FY12	FY10	FY08	FY09	
• % Operational Flowrate (100% equals 6 Mgal/yr. at 6.44 [Na])	100%	100%	100%	10%	15%	20%	37%	
Date Additional Salt Waste Processing Capacity provided				FY16	FY15	FY13	FY10	
• % Additional Operational Flowrate (100% equals 6 Mgal/yr. at 6.44 [Na])	n/a	n/a	n/a	100%	80%	50%	8-10%	
• Max Yearly % Operational Flowrate	100%	100%	100%	110%	95%	70%	47%	
Salt Solution Processing Rate (kgal/yr.)								
• FY08						1,200		
• FY09						1,200	2,200	
• FY10	3,000	3,000	3,000		900	1,200	2,700	
• FY11	6,000	6,000	6,000		900	1,200	2,700	
• FY12	6,000	6,000	6,000	600	900	1,200	2,700	
• FY13	6,000	6,000	6,000	600	900	4,200	2,700	
• FY14	6,000	6,000	6,000	600	900	4,200	2,800	
• FY15	6,000	6,000	6,000	600	5,700	4,200	2,800	
• FY16 until end of program	6,000	6,000	6,000	6,600	5,700	4,200	2,800	

[1] Technology improvements have enabled more waste to be included in each can via both increased canister fill height and increased waste loading. To ensure appropriate comparisons with previous plans, this plan refers to canister production in terms of equivalent (pre-FY03 canister loading) canisters.

Table 2–B Key Milestones

Key Milestone	Rev 12 Base Case	Rev 12 Stretch Case	Rev 12 Super Stretch Case	Rev 13 Case 1	Rev 13 Case 2	Rev 13 Case 3	PMP
Key Risk Reduction Dates							
Date when all non-compliant tanks are emptied	FY19	FY17	FY15	FY18	FY18	FY15	FY11
Date when all non-compliant Tanks are closed	FY21	FY20	FY18	FY20	FY20	FY17	FY13
Date by which salt processing is completed	FY24	FY22	FY22	FY27	FY27	FY28	FY19
Date by which sludge processing is completed	FY29	FY27	FY23	FY27	FY27	FY24	FY19
Regulatory Commitments							
Are all STP commitments met?	No	Yes	Yes	Yes	Yes	Yes	Yes
Are all FFA regulatory commitments met?	No	No	Yes*	No	No	Yes*	Yes
* Yearly closure commitments (total number of tanks/yr.) are met							
Canister Storage Locations							
• Make additional 450 GWSB 1 locations usable	FY05-07	FY03-05	FY03-05	By FY04	By FY04	By FY04	By FY04
• Begin work on additional Canister Storage locations (GWSB 2 or Modules)	Module #1 FY07	Module #1 FY10	Module #1 FY04 Module #2 FY07	Module #1 FY07	Module #1 FY08	Module #1 FY04 Module #2 FY07	GWSB #2 FY03
• Place GWSB 2 or Modules into Radioactive Operations	Module #1 FY10	Module #1 FY13	Module #1 FY07 Module #2 FY10	Module #1 FY10	Module #1 FY11	Module #1 FY07 Module #2 FY10	GWSB #2 FY06
Key Space Management Activities							
• Return Tank 48 for waste storage/ Salt Feed tank service	FY10	FY10	FY10	FY12	FY06	FY06	FY06
• Reuse Tank 49 for waste storage	Jul-01	Jul-01	Jul-01	Jul-01	Jul-01	Jul-01	In Service
• Reuse Tank 50 for waste storage	Sep-02	Sep-02	Sep-02	Jul-02	Jul-02	Jul-02	Nov-02
• Tank 37 used for 3H Evap Drop Tank	Sep-02	Sep-02	Sep-02	Aug-02	Aug-02	Aug-02	Feb-03
• Tank 37 Salt Dissolution #2	n/a	Mar-05	Mar-04	Jan-04	Jan-04	Jan-04	Mar-04
• Tank 29 req'd for 3H Evap Drop Tank	n/a	n/a	n/a	n/a	n/a	n/a	Feb-05
• Tank 31 req'd for 3H Evap Drop Tank	n/a	n/a	n/a	n/a	n/a	Nov-06	n/a
• Tank 27 req'd for 2F Evap Drop Tank	Mar-06	May-06	Feb-05	Jul-04	Jul-04	Jul-04	Apr-06
• Tank 42 req'd for 2H Evap Drop Tank	Feb-12	Feb-11	Feb-10	n/a	n/a	n/a	n/a
• Tank 41 req'd for 2H Evap Drop Tank	n/a	n/a	n/a	Oct-06	Oct-06	Oct-06	n/a
• 2F Evaporator Shutdown	FY09	FY09	FY09	FY09	FY09	FY09	FY09
• 2H Evaporator Shutdown	FY29	FY27	FY23	FY25	FY26	FY26	FY13
• 3H Evaporator Shutdown	FY27	FY25	FY21	FY21	FY21	FY21	FY16
Repository Activities							
• Start shipping canisters to the Federal Repository	FY10	FY10	FY10	FY10	FY10	FY10	FY10
• Complete shipping canisters to Federal Repository	FY39	FY39	FY39	FY39	FY39	FY40	FY20
Facility Deactivation Complete	FY40	FY40	FY40	FY40	FY40	FY41	FY21
Life Cycle Costs							
• In Escalated Dollars ($ billion)	19.6	18.0	16.2	20.7	20.4	19.3	11.5

1.3 *Waste Processing Summary*

The charts in the appendices summarize the planning modeling that supports the Plan. Appendix G represents the main program elements of the PMP Case. The bold blue line in this chart displays the total waste inventory predicted. Notice that in years FY02-FY08, the inventory for the PMP case is greater than predicted for Case 3 of Revision 13. This is also shown in Appendix I (Remaining Tank Inventory). The reason for this is twofold. The PMP case assumes more salt is processed during these years than in Case 3, which temporarily expands waste volumes. The benefit of accelerated processing is realized in later years when the program finishes eight years earlier than the previous model. The second reason is that evaporator performance more closely follows actual facility capabilities. Field data were collected and computer algorithms were revised to emulate evaporator capacity. Conversely, Case 3 over-predicted evaporator performance, which tended to display overly aggressive reductions in waste volume during these initial years.

This chart also displays waste inventory volumes broken out by tank type (Type III storage versus non-compliant tanks). Also shown are time-line graphics for the various programs. The first diamond for a sludge batch time-line represents the date when sludge is first moved into the preparation tank. The last diamond represents the date when sludge is first sent to DWPF. The first diamond for a low curie tank time-line corresponds to the date when interstitial liquid is first removed. The last diamond signifies the date when salt will be removed down to the heel. The ARP time-lines are similar in structure to the low curie lines. Notice that for each of these programs, some tanks are shown more than once. This is because, these tanks are evaporator drop tanks and will undergo several dissolution campaigns during heel consolidation. The salt program time-lines are more general and represent the length of each program.

Appendix H shows the predicted available Type III storage space. Note that there is less space available for storage in Type III tanks between FY02 and FY09 for the PMP case than for the same period for Case 3. The reasons for this are discussed in the preceding section.

Appendix J represents the remaining inventory for the non-compliant tanks. The PMP case reflects a plan that gets waste out of non-compliant tanks over three years sooner than for Case 3 of Rev 13. Take note that an 18-month stagnant period is predicted during FY09 and FY10. This is because Tanks 12 and 15 will be waiting on sludge transfer to Tank 40 for Sludge Batch 8.

Appendix N displays the remaining inventory predicted for the Type IV Tanks. One item of note relating to this chart is an increase in Type IV tank volume predicted at the start of FY11. This is because the SASs are scheduled for restart at time to coincide with the start of the SWPF. DWPF recycle volume is over one million gallons more per year during SAS operation, which will overwhelm the 2H evaporator system.

2. Strategic HLW Initiatives Discussion

Since the issuance of Revision 13, major cleanup reform initiatives have been proposed to accelerate completion of the Site's EM missions.

The PMP describes the approach that will be taken to achieve accelerated cleanup of SRS. The existing cleanup plan is not appropriately focused on risk reduction, thus driving SRS to a cleanup program that costs too much and takes too long. SRS is resolute that changing to an approach that is focused on reducing risk and accelerating cleanup will enable the Site to complete its EM mission by 2030, with an aggressive objective of achieving cleanup by 2025. This will be accomplished by directing funding and resources on projects that pose the greatest risk, and adopting new ways of doing business to accelerate the cleanup program.

Fourteen strategic initiatives are identified that lead to the successful acceleration of the SRS EM cleanup program. These initiatives are in the areas of HLW, nuclear materials, solid waste, environmental restoration, facilities deactivation and decommissioning and security. Details of the scope for these initiatives are discussed in the PMP.

Two of the fourteen initiatives are specific to HLW and are incorporated in the supplement A brief summary description of the two HLW initiatives is provided below. A more detailed description of the scope, benefits and prerequisites to success for each initiative is included in the PMP.

<u>WM-1, Expedited HLW Processing</u> This encourages completing HLW processing eight years earlier than previously scheduled in Revision 13 (2019 versus 2027) thereby saving $5.4 billion for SRS and an additional $1 billion for the DOE. HLW will be segregated into four components and the treatment will be tailored for each of these components. In addition, this initiative classifies the HLW tanks as "closure facilities" to appropriately define the requirements to manage these tanks consistent with their use (waste storage) and endstate.

<u>WM-2, Expedited Risk-Based Tank and Facility Closure</u> HLW tanks and other facilities slated for closure are transitioned to a risk-based approach, which reduces the cost of the HLW program by $0.7 billion.

2.1 *HLW Initiatives to Meet the Vision*

The major processing assumption improvements made in the PMP are summarized below.

2.1.1 Expedite Sludge Processing

The PMP expedites sludge processing which is the highest risk component of the HLW. The assumption to accelerate sludge processing is based on the culmination of several years of research that supports the breakthrough development of specific frit (glass forming materials) for each batch of sludge feed at DWPF. The change to a specialized frit for each sludge batch allows the glass to melt at a lower temperature, which allows DWPF to increase its annual canister production rate up to 230 canisters per year. The change to the newly developed frit will also make it possible to place approximately 25% more waste in each canister. These changes will still produce a glass that meets all repository requirements. For example, if DWPF produces 230 canisters, these canisters will dispose the same amount of waste that would usually require 280 canisters. The yearly production of 280 "equivalent" canisters is an increase from the average of 230 canisters per year produced during FY98-FY01.

To meet the increased production levels, the preparation of future sludge batches must also be accelerated by incorporating streamlined waste removal methods for sludge removal.

2.1.2 Expedite Salt Processing

The PMP provides for the majority of the salt waste stored in the Tank Farms to be processed through alternative salt disposition strategies. In the PMP Case, approximately one-third of the 84 million gallons (the volume adjusted to 6.44 sodium molarity) of salt solution is processed by each of the identified salt processing methods: low curie, low curie with actinide removal, and high curie via the SWPF. This is a significant change from Revision 13 where three different strategies were modeled to establish processing boundaries for salt waste processing. The most aggressive of the Revision 13 cases (Case 3) only assumed 3 million gallons of hard saltcake (equivalent to 10-11 million gallons of salt solution) were processed as low curie waste to Saltstone. The remaining 73 million gallons was processed through the CSSX processing facility.

By implementing the PMP, processing of all HLW can be completed in 2019. This is eight years earlier than forecasted in Revision 13.

2.1.3 Expedite Risk-Based Tank and Facility Closure

A risk-based plan for facility closure will result in tank closures complete by 2020, eight years earlier than scheduled. The method of the previous tank closure program was to remove as much material from the tank as technically possible and then close the tank with grout as soon as it was empty. With some modifications to DOE Order 435.1 implementation guidelines, new performance assessment requirements will now be used to determine the appropriate heel removal endpoint for each tank. The program may then be able to support a broader range of materials used to close tanks, such as grout containing depleted uranium or grout that contains some of the processed salt materials.

Even without modifications to the DOE order, the tank closure program can be modified to schedule the closure to focus the Site's efforts on risk reduction. This approach allows for large groups of tanks to be emptied, and once emptied, the tanks will be closed in a "batch" fashion after the highest risk reduction activities have been completed at SRS. Grouping tanks for closure significantly reduces the cost of completing the tank closures. This concept of risk-based tank closures ensures the protection of human health and the environment.

The second portion of this initiative is risk-based facility closures. The method of the previous facility closure program was to remove as much material from the facility as technically and economically practicable and then close the facility by filling it with grout or removing the structure as soon as processing was completed.

Some improvements that move facility closures to a risk-based approach can be accomplished by designating SRS as a long-term National Security Site. This allows facilities at the center of the Site to be closed without returning this area to greenfield conditions. This approach reduces the overall risk to workers, and allows these facilities to be placed into a safe, de-inventoried, and locked away condition. This concept for closure is based on satisfying performance assessment requirements rather than on returning the area to a near-greenfield condition.

2.1.4 Acceleration of Canister Shipping

To support the completion of the HLW Program by 2020, the PMP also assumes that the shipment of canisters to the Federal Repository can be accelerated from the Revision 13 rate of 205 canisters per year starting in 2010 to a rate of 500 canisters per year starting in 2010. This would require a revision to the Federal Repository integrated acceptance schedule.

2.2 *Prerequisites to Success*

There are a number of prerequisites needed for the initiatives described above. These are summarized below. The prerequisites are described in detail in the PMP with essential decisions, deliverables and milestones documented and tracked in a Responsibility Assignment Matrix (RAM). Key prerequisites are:

- Adequate funding will be provided to implement the cleanup reform vision (See Appendix A);
- Financial flexibility provided by allowing execution of the HLW Program using one "color of money" [2] will improve the chance of achieving program success;
- Modified requirements will be adopted for closure facilities;
- Implementation guidance to DOE Order 435.1 is revised to provide more realistic intruder analysis guidelines;
- Waste Incidental to Reprocessing (WIR) requests will be approved;
- Regulators will support Low Curie and Actinide Removal salt processing programs and future directions on Tank Closure;

[2] The term "color of money" refers to funding source (e.g. cost or capital) as defined in the Federal Budget.

- Approval funding authority will be received for a FY03 Canister Storage Line Item (Glass Waste Storage Building II) to support accelerated canister production;
- Federal Repository will start up in FY10 and the shipment schedule for SRS canisters will be expedited from 205 to 500 canisters per year starting in FY10; and
- SRS will be designated as a long-term national security site.

3. Key Assumptions and Major Risks

3.1 *Key Assumptions*

Consistent with Revision 13, a set of agreed-to assumptions was developed by the WSRC and DOE-SR process owners. The assumptions include details on such items as the processing rates for HLW evaporators, designated uses of waste tanks and the forecast volumes of influents from the canyons and DWPF to the tank farms. A brief discussion on some of the major assumptions is provided below.

3.1.1 Salt Processing.

The order and destination of processing saltcake (low curie versus actinide removal) was selected using the "Low Curie Salt Waste Tank Selection Strategy" (HLW-SDT-2002-00004, Rev. 0) with some exceptions. The main exception is saltcake in Tanks 1, 2 and 3 will be processed early in the actinide removal sequence to accelerate waste removal from Tanks 1-8. The order and timing of each low curie salt tank can be seen in Appendix G. Note that Tanks 29 and 37 are shown on the chart more than once. This is because these tanks will be re-used as concentrate receivers in the evaporation process.

Generally, saltcake in the H-Tank Farm will be processed through the low curie process and saltcake in the F-Tank Farm will be processed through the actinide removal process. High curie supernate from both tank farms will be processed at the SWPF.

Start-up and Processing Rates

In the PMP case, roughly one-third of the 84 million gallons of salt solution shall be processed by each of the three salt processes: low curie, actinide removal and high curie. Refer to Appendix D for the assumed yearly salt solution processing rates for each of these processes. Identified facilities or processing is not identified to achieve some of the assumed processing rates listed below. These disconnects are discussed further in Section 3.2. The assumed start dates for each process are also provided below.

Low Curie

Low curie processing started in FY03. Note in Appendix D that there is a two-year break in FY11 and 12 with no low curie processing. During this time, salt heel consolidation is underway in the 3H Evaporator system to establish stored saltcake that meets the criteria for low curie processing.

Actinide Removal

	Date	Processing Rate
Initial operations using modified 512-S Facility	10/04	1.2 gpm
Increased capacity using 241-96H Facility	10/06	3.0 gpm
Additional increased capacity	4/07	6.0 gpm

High Curie

The SWPF startup is assumed in FY09. To meet the target completion date of 2019, the SWPF will process the salt solution up to 45-50% of design flowrate capacity (up to 2.8 million gallons per year). Note that 100% design capacity is defined as 6.0 million gallons per year at 6.44 sodium molarity solution.

3.1.2 Sludge Processing

DWPF Production Rate

The following chart provides the DWPF canister production rates. DWPF outages (including melter outages) are included in the production numbers.

	Actual	Equivalent*
FY01	227 (Actual)	227 (Actual)
FY02	160 (Actual)	163 (Actual equivalent)
FY03	230	280
FY04	230	280
FY05	230	280
FY06	230	280
Total FY01-06	**1,307**	**1,510**
FY07-End	230	280

* Increased canister fill height from 96" to 100" was implemented in April FY02. Therefore, each can made after this date contained ~4% more waste. The equivalent can count in FY02 reflects the implemented canister fill height change. Additional waste loading initiatives are assumed starting in FY03. Therefore, the 230 cans shown will be equivalent to ~280 cans by FY02 standards.

Sludge Batch Sequencing

Several changes in sludge batch sequencing are made in this supplement from what was assumed in Revision 13. The changes are driven by the objective to process higher curie material in Tank 13 earlier in the sequence. Sludge from the high-risk F-tank farm tanks is also moved up to an earlier batch to accelerate closure of these tanks.

	Rev. 13 Cases	**PMP Case**
Sludge Batch 2	Tk 8 & 40	Tk 8 & 40
Sludge Batch 3	Tk 7 & 18 (70% of all)	Tk 7 & 18 (70% of all)
Sludge Batch 4	Tk 7 & 18 (30% of all), 11	Tk 7 & 18 (30% of all), 11
Sludge Batch 5	Tk 15, 26	Tk 13 (50%), 26
Sludge Batch 6	Tk 5, 6, 12 & 13 (30%)	Tk 4, 5, 6 & 13 (50%)
Sludge Batch 7	Tk 13 (70%), 4, 33 (66%) & 39(34%)	Tk 33 (60%), 34, 39 & 47
Sludge Batch 8	Tk 21, 22, 23, 33 (34%), 34, 39(66%) &47	Tk 21, 22, 23, 33 (40%), 12 &15
Sludge Batch 9	Tk 32 & 43	Tk 32 & 43
Sludge Batch 10	Tk 35 & Misc. heels	Tk 35 & Misc. heels

3.1.3 DWPF Recycle.

The PMP Case assumes that type IV tanks in H-tank farm continue to be used for receipt and settling of the DWPF recycle stream. The received recycle waste is then transferred to the 2H-evaporator system for evaporation. Recycle will also be used as dilution water in the low curie process to adjust the dissolved salt solution to the desired sodium concentration. In 2012, it is assumed that an alternative handling process is available and that DWPF recycle will no longer be received into the tank farm. The alternative recycle handling process will be selected based on economic and technical feasibility.

3.1.4 Evaporator Performance.

Assumed processing rates for operation of the three HLW evaporators (2F, 2H and 3H) are consistent with actual FY02 performance. Forecast evaporator performance is similar to that discussed in detail in Revision 13, Section 1.7.1.

Transfer Planning.

The six month integrated transfer schedule (reference date October 8, 2002) developed by the HLW Transfer Planning Team was used as the basis for near-term transfers and evaporator operations.

3.1.5 Canister Shipment.

The shipment of SRS canisters to the Federal Repository can be made at the rate of 250 canisters in FY10 and at a rate of 500 canisters per year, thereafter. The shipment facility and the required shipping casks are assumed available to support this rate.

3.2 *Major Risks*

There are many risks associated with the successful implementation of the PMP case. Several of the major risks discussed in Section 4 and 5 of Revision 13 are also applicable to the PMP case. These include such risks as tank space management and age of the HLW facilities. Some of the major risks that are applicable to the success of PMP implementation are as follows.

3.2.1 Evaporator performance able to match assumed operating rates.

The best way to ensure evaporator performance meets forecast objectives is to provide the best-feed material for each evaporator system. This would maximize the ability of the evaporators to efficiently recover space previously lost from the receipt of influent streams from the canyons, DWPF and internal sources (*i.e.* sludge washing decants, transfer dilution, flushes, etc.). Maximizing the efficiency of the evaporator operations requires the following:

- Maintaining salt receipt space in evaporator drop tanks;
- Maintaining concentrated high caustic (referred to as liquor) storage space in tanks outside the evaporator systems; and
- Maintaining qualified feed available for evaporation.

Emergent technical or physical issues associated with evaporator operations would also impact evaporator performance. Examples in recent years include the loss of 2H Evaporator operations for approximately 21 months because of chemistry issues, and curtailed operations of the 3H Evaporator in FY01/FY02 because of cooling issues with the concentrate receipt tank (Tank 30).

A “Transfer Planning Team” was chartered to integrate specific HLW activities, particularly tank-to-tank transfers and evaporator operations. The team addresses the risks and resolves issues associated with meeting processing commitments and optimizing evaporator performance. Chaired by HLW Operations, the team consists of representatives that provide various cross-functional viewpoints such as process chemistry, program planning, scheduling, and facility operations. Operating the evaporators and performing the associated transfers per the approved transfer plan allows for the most efficient operation of the tank farm system.

For development of this supplement, evaporator performance consistent with that forecast in Revision 13 was assumed. These assumed evaporation rates are consistent with historical performance including recent major system outages.

3.2.2 Successful implementation of planned low curie and actinide removal salt disposition plans.

Successful implementation of the low curie and actinide removal programs increases operational flexibility by generating Type III tank space. The inability to implement these alternative salt disposition techniques adversely affects the completion date of 2019 for the HLW program. That is, the length of the HLW processing program will be extended if the yearly processing rates for low curie and actinide removal are not achieved.

In FY02 and early FY03, low curie processing has not proceeded as forecast in the PMP. The removal of interstitial supernate has taken longer than predicted in Tank 41, the initial low curie processing tank. In addition, present data in Tank 41 indicates that modifications will be required at the Saltstone facility to process the dissolved salt solution.

In addition, the technique for achieving the assumed FY07 processing rate of 6.0 gallon per minute through the ARP has not been identified. Test and actual facility performance data and continued engineering evaluations will be used to determine a method for throughput improvements.

Lack of success in alternative salt processing also impacts the efficiency of evaporator operations due to limited salt receipt space. During the evaporation process, salts are formed in the concentrate receipt tank and the tank eventually becomes saltbound. Either an alternative concentrate receipt tank must be made available or a salt dissolution campaign must be performed to remove the salt out of the evaporator system.

Another consequence associated with low curie and actinide removal is that if a large volume of saltcake is dissolved and then does not meet the Saltstone WAC requirements, there is limited salt receipt space in the evaporator systems to re-concentrate the resultant salt solution back to a saltcake form. This would have a negative impact on Type III tank space proportional to how much saltcake was dissolved.

3.2.3 Ability to implement high curie salt disposition at a rate higher than currently planned.

The current Engineering, Procurement and Construction (EPC) contract for the Caustic Side Solvent Extraction (CSSX) facility provides processing capacity of 1 million gallons per year at 6.44 sodium molarity. This is equivalent to an approximate 17% design flowrate capacity where 100% is defined as 6 million gallons per year. The EPC contractors will provide sensitivity analysis for 1%, 5%, 10%, and 20% design flowrate capacities. DOE may select one of those processing rates for the actual facility. The accelerated cleanup target is to complete processing of all salt solution by 2019. To meet the target date, it is assumed that either technical improvements have been implemented to allow ~47% design flowrate capacity (2.8 million gallons per year) to be realized in the CSSX facility or that alternative treatment options have been implemented to make up the difference.

The inability to process high curie salt solution through the CSSX facility or by alternative means at the required rate of 2.8 million gallons per year directly impacts the ability to complete the HLW program by the forecast completion date of 2019. That is, the length of the HLW processing program will be extended if the assumed yearly processing rates for high curie processing are not achieved.

3.2.4 Ability to integrate transfers required supporting sludge and salt processing.

Significant planning integration will be required in the outyears to remove waste from tanks to ensure feed is available to meet the accelerated sludge and salt processing forecasts. As discussed in Section 3.2.1, to address the risks associated with successfully integrating the activities required to meet processing commitments, a Transfer Planning Team was chartered to develop and monitor a HLW transfer and evaporator feed health plan.

3.2.5 Ability to prepare salt solution quickly enough to meet SWPF feed assumptions.

To meet the yearly-feed requirements and allow time for transfers and feed characterization, salt removal will often be required from multiple tanks during the same time period. Salt removal techniques must be effective enough to provide approximately 1 to 1.2 Mgal of salt solution every 2 months to meet salt processing needs.

3.2.6 Potential for increased influents above those that have been forecast.

The PMP case is based on the latest forecasts for future influents to the Tank Farms. Influents significantly greater than forecast could adversely affect processing commitments depending on the volume and time that they are received. An example of a potential influent impact would be if the DWPF steam atomized scrubbers (SAS) in the DWPF melter off-gas system had to be returned to operation prior to the start of the SWPF. This would be required if a higher than expected cesium level was seen in future sludge-only batches. Operation of the SASs results in a million-gallon increase in the annual DWPF recycle stream to the Tank Farm.

Another potential source of increased influents is from the canyons. Several different canyon shutdown acceleration scenarios are under evaluation at the time of the supplement development. The volume of waste and timing of when it is sent to the Tank Farms could vary widely depending on the final disposition decisions.

3.2.7 Successful recovery of Tank 48 for HLW storage.

The PMP case requires Tank 48, which had previously been allocated as a salt processing tank, to be returned to the Tank Farms to be used as the feed tank for the actinide removal process when capacity enhancements are implemented in FY06. However, Tank 48 currently contains approximately 250 kgal of benzene-bearing solution from earlier ITP demonstration runs that must be dispositioned prior to its return to waste service.

In FY02, a multi-disciplined task team evaluated possible methods for the disposition of the Tank 48 organics. The team recommended several disposition techniques that should be further pursued.

The principal risk with the return of Tank 48 to HLW waste service is that a final treatment process for the existing organics has still not been identified. The inability of the reaction to reach a satisfactory endpoint in a timely manner could significantly delay the return of Tank 48 to waste service and therefore impact planned actinide removal processing.

3.2.8 Canister Shipment Rate can be supported.

An integrated canister acceptance schedule has been developed for receipt at the Federal Repository. This integrated schedule assumes 205 canisters per year from SRS starting in FY10. To meet the PMP target of 2020 for completion of SRS canister shipment, the rate must be increased to 500 canisters per year starting in FY10. This assumed new target must be integrated with the associated PMP shipment targets for all the applicable DOE sites to develop a revised canister acceptance schedule. The length of the HLW program will be extended if the assumed yearly canister shipment rates are not achieved. Note in Appendix F that Glass Waste Storage Building (GWSB) Number 2 is sized at the same capacity as GWSB Number 1. This provides some contingency in the event that the SRS shipping rate can not be increased to the rates assumed in the PMP.

Appendixes

Appendix A -Funding

PMP Budget Authority in Escalated Dollars

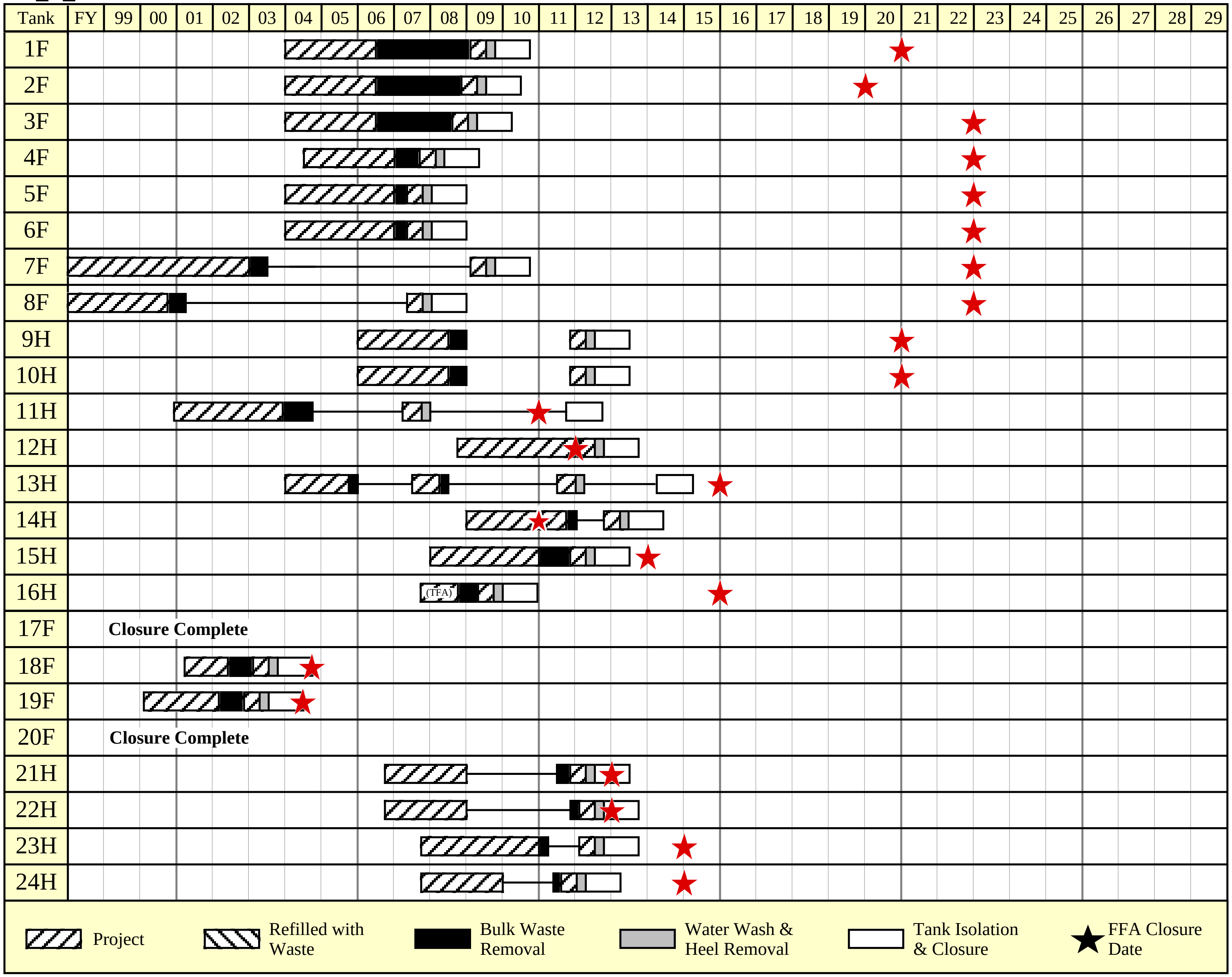
Project Title		FY03	FY04	FY05	FY06	FY07	FY08	FY09	FY10	FY11	FY12	FY13
HL-01 H Tank Farm West		89,611	94,076	96,503	97,215	100,892	104,537	109,695	112,657	115,698	118,822	122,030
HL-04 H Tank Farm East & Sludge Operations		64,203	65,382	69,689	68,530	71,180	73,746	77,085	79,166	81,303	83,499	85,753
HL-01 Total		**153,813**	**159,458**	**166,191**	**165,746**	**172,072**	**178,282**	**186,780**	**191,823**	**197,002**	**202,321**	**207,784**
Move Support to Melter Outage												
HL-02 F Tank Farm		**68,167**	**69,394**	**70,995**	**72,908**	**75,142**	**78,326**	**73,657**	**69,085**	**64,698**	**66,444**	**61,594**
Move Support to Melter Outage												
HL-03 Waste Removal & Tank Closures												
WR Ops w/ Demo Projects		3,971	9,773	12,265	12,770	13,227	13,721	14,091	14,472	14,862	15,264	15,676
Am/Cm		1,745	-									
LI: Salt Tanks	Tk 31	1,445	35,421	36,201	59,107	22,724	16,711	17,502	43,772	35,778	14,075	6,446
Low Curie		5,914	4,171	3,692	4,327	4,397	4,474	5,074	5,211	5,352	5,496	5,644
Actinide		5,282	19,088	18,947	20,283	20,645	21,005	21,572	22,155	22,753	23,367	23,998
Salt Alternatives (512-S, Tk 48, etc)		7,439	288	-	-	(0)	(0)	(0)	(0)	(0)	(0)	(0)
LI: Water Wash & Isolation	Tks 18, 19	5,893	2,772	-	-	22,130	11,964	15,392	-	31,802	45,055	19,006
WR: Tank Closure	Tks 18, 19	5,288	13,051	4,357	8,396	9,202	26,758	20,861	32,121	790	68,953	89,283
HL-03 Total		**36,977**	**84,564**	**75,461**	**104,883**	**92,325**	**94,633**	**94,492**	**117,730**	**111,336**	**172,209**	**160,053**
HL-12 LI: Waste Removal												
LI: WR from Sludge Tanks	Tk 11	13,805	42,725	58,234	34,421	29,842	27,827	34,892	35,512	30,269	28,083	18,582
LI: Infrastructure Upgrades		9,338	15,458	12,139	14,577	5,605	18,671	32,344	33,217	35,979	26,393	28,552
LI: Acid Front End		-	-				-	23,754	27,255	27,728	-	-
LI: Acid Evap & Space Management	Tk 18, 37	-	-	-	-	-	0	-	-	-	-	-
LI: Piping, Evaps & Infrastructure		-	-	-	-	-	-	-	-	-	-	-
HL-12 Total		**23,143**	**58,183**	**70,373**	**48,998**	**35,447**	**46,498**	**90,990**	**95,985**	**93,976**	**54,476**	**47,133**
										205,313		
HL-11 LI: Tk Fm Services Upgrade II		**571**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
HL-05 Vitrification		**127,918**	**124,487**	**132,768**	**137,360**	**136,924**	**145,613**	**152,360**	**157,690**	**156,036**	**163,778**	**171,262**
Melter Outage												
HL-06 Glass Waste Storage		**5,451**	**48,122**	**39,608**	**1,399**	**5,249**	**19,057**	**19,580**	**6,653**	**1,908**	**1,960**	**2,265**
HL-13 Salt Disposition												
Salt EPC Support		2,000	3,600	2,100	2,100	2,201	18,200	61,822	63,486	64,976	66,730	68,532
LI: Salt Alternative		28,000	58,400	107,900	107,900	107,799	91,800	-	-	-	-	-
HL-13 Total		**30,000**	**62,000**	**110,000**	**110,000**	**110,000**	**110,000**	**61,822**	**63,486**	**64,976**	**66,730**	**68,532**
				16359	16,359							
FA-24 Facility Decontamination/Decommissioning		**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
			-									
HLW TOTAL		**446,040**	**606,209**	**665,397**	**641,294**	**627,159**	**672,409**	**679,681**	**702,451**	**689,933**	**727,919**	**718,623**
HLW w/o Salt Total		**416,040**	**544,209**	**555,397**	**531,294**	**517,159**	**562,409**	**617,859**	**638,965**	**624,957**	**661,189**	**650,091**
6,340		417,349	544,212	555,404	531,266	517,172	562,272					
		6,911										
		(1,309)	**(3)**	**(7)**	**28**	**(13)**	**137**					
Solid Waste Facilities												
ETF		**16,735**	**18,708**	**20,677**	**22,431**	**23,404**	**23,575**	**18,687**	**19,568**	**19,710**	**22,195**	**27,090**
SS		**13,101**	**23,437**	**24,462**	**26,382**	**25,030**	**28,853**	**36,079**	**34,249**	**34,718**	**45,332**	**49,123**
SW TOTAL		**29,835**	**42,146**	**45,139**	**48,813**	**48,433**	**52,428**	**54,766**	**53,818**	**54,428**	**67,528**	**76,213**
Life Cycle Cost		**475,876**	**648,354**	**710,536**	**690,107**	**675,592**	**724,837**	**734,447**	**756,268**	**744,361**	**795,447**	**794,836**

Appendix A -Funding

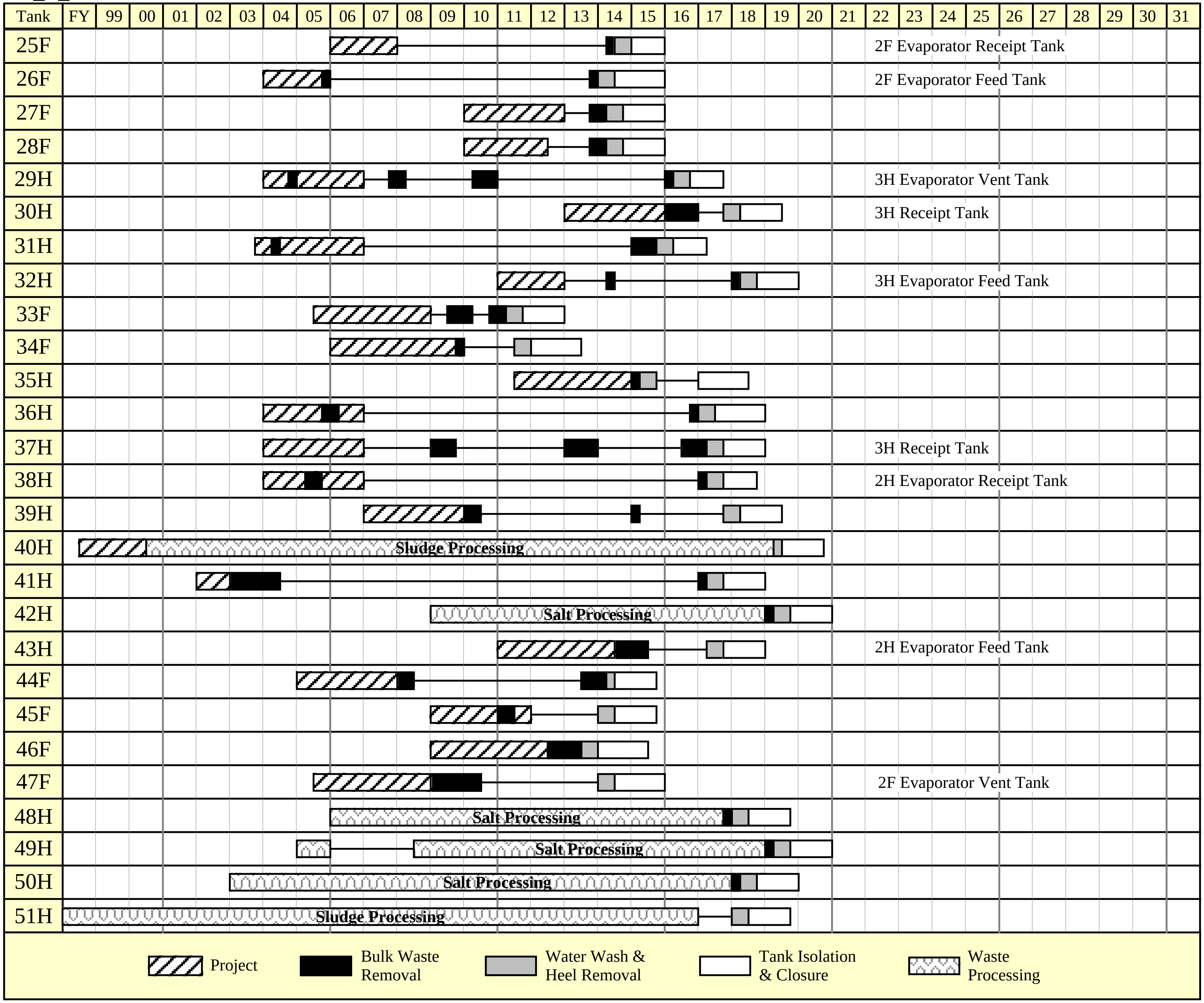
PMP Budget Authority in Escalated Dollars

Project Title	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	IBS BA Cumulative FY03-End
HL-01 H Tank Farm West	112,793	105,812	97,802	100,443	-	-	-	-			1,578,586
HL-04 H Tank Farm East & Sludge Operat	88,068	90,446	92,888	95,396	97,972	50,309	-	-			1,334,615
HL-01 Total	**200,861**	**196,258**	**190,691**	**195,839**	**97,972**	**50,309**	**-**	**-**			**2,913,201**
Move Support to Melter Outage											
HL-02 F Tank Farm	**57,762**	**-**	**-**	**-**	**-**	**-**	**-**	**-**			**828,172**
Move Support to Melter Outage											
HL-03 Waste Removal & Tank Closures											
WR Ops w/ Demo Projects	16,099	8,267	8,490	8,719	8,955	-	-	-			**190,621**
Am/Cm											**1,745**
LI: Salt Tanks	14,353	4,057	-	-	-	-	-	-			**307,592**
Low Curie	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)			**53,751**
Actinide	24,646	25,312	25,995	26,697	-	-	-	-			**321,746**
Salt Alternatives (512-S, Tk 48, etc)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)			**7,725**
LI: Water Wash & Isolation	27,547	2,161	21,355	25,230	26,532	3,170	-	-			**260,007**
WR: Tank Closure	77,964	60,699	42,823	66,359	90,147	89,823	18,088	-			**724,963**
HL-03 Total	**160,609**	**100,496**	**98,662**	**127,005**	**125,634**	**92,993**	**18,088**	**(0)**	**-**	**-**	**1,868,149**
HL-12 LI: Waste Removal											
LI: WR from Sludge Tanks	3,849	-	-	-	-	-	-	-			**358,041**
LI: Infrastructure Upgrades	29,322	28,589	-	-	-	-	-	-			**290,186**
LI: Acid Front End	-	-	-	-	-	-	-	-			**78,737**
LI: Acid Evap & Space Management	-	-	-	-	-	-	-	-			**0**
LI: Piping, Evaps & Infrastructure	-	-	-	-	-	-	-	-			**-**
HL-12 Total	**33,171**	**28,589**	**-**	**-**	**-**	**-**	**-**	**-**			**726,964**
HL-11 LI: Tk Fm Services Upgrade II	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**			**571**
HL-05 Vitrification	**168,339**	**177,466**	**184,640**	**188,211**	**181,927**	**92,494**	**-**	**-**			**2,599,274**
Melter Outage											
HL-06 Glass Waste Storage	**2,326**	**2,388**	**2,453**	**2,519**	**2,587**	**2,657**	**2,729**	**(0)**			**168,912**
HL-13 Salt Disposition											
Salt EPC Support	70,383	72,283	74,235	76,239	78,297	40,206	-	-			**767,389**
LI: Salt Alternative	-	-	-	-	-	-	-	-			**501,800**
HL-13 Total	**70,383**	**72,283**	**74,235**	**76,239**	**78,297**	**40,206**	**-**	**-**			**1,269,189**
FA-24 Facility Decontamination/Decommissi	-	-	-	7,501	-	94,284	111,972	-			**213,757**
HLW TOTAL	**693,451**	**577,481**	**550,681**	**597,313**	**486,417**	**372,942**	**132,789**	**(0)**	**-**	**-**	**10,588,189**
HLW w/o Salt Total	**623,069**	**505,198**	**476,446**	**521,074**	**408,120**	**332,736**	**132,789**	**(0)**	**-**	**-**	**9,319,000**
6,340											
Solid Waste Facilities											
ETF	**22,201**	**22,477**	**25,624**	**23,126**	**23,751**	**12,196**	**-**	**-**	**-**	**-**	**362,155**
SS	**41,433**	**49,034**	**44,012**	**26,329**	**26,636**	**14,154**	**-**	**-**	**-**	**-**	**542,364**
SW TOTAL	**63,634**	**71,511**	**69,636**	**49,455**	**50,387**	**26,350**	**-**	**-**	**-**	**-**	**904,519**
Life Cycle Cost	**757,086**	**648,993**	**620,317**	**646,768**	**536,804**	**399,292**	**132,789**	**(0)**	**-**	**-**	**11,492,708**

Appendix B – Waste Removal Schedule



Appendix B – Waste Removal Schedule



Appendix C – Tank Farm Volume Balance

End of Fiscal Year	Influents (kgal)										Effluents (kgal)								Total Inventory (kgal)
											Space Recovered by Evaporation								
	F-Canyon	H-Canyon	DWPF Recycle	299-H	RBOF	ETF (3)	Inhibited Water	Jet Dilution	Other	**Total In**	2F Evap	2H Evap	3H Evap	Salt Solution to Saltstone	Salt Solution to Processing	Sludge to DWPF	Other	**Total Out**	
																		Beginning Volume	**36,980**
FY03	477	372	1,328	33	120	-	4,777	462	226	**7,795**	1,267	1,473	2,689	2,582	-	389	511	**8,911**	**35,865**
FY04	192	430	1,328	24	120	-	4,517	684	181	**7,476**	505	871	729	4,000	-	145	1,043	**7,293**	**36,048**
FY05	157	351	1,328	36	-	-	6,017	484	522	**8,894**	560	891	1,909	5,584	-	127	1,051	**10,122**	**34,820**
FY06	156	431	1,328	36	-	-	4,591	318	378	**7,237**	973	2,495	1,832	5,774	-	126	281	**11,481**	**30,576**
FY07	-	559	1,328	36	-	-	7,622	585	292	**10,422**	495	1,344	1,383	5,700	-	209	677	**9,809**	**31,190**
FY08	-	426	1,328	36	-	-	4,714	478	158	**7,140**	576	1,725	3,231	4,618	-	176	441	**10,767**	**27,563**
FY09	-	154	2,231	36	-	-	7,010	558	472	**10,461**	992	1,844	1,580	4,709	2,200	126	594	**12,044**	**25,979**
FY10	-	-	2,231	36	-	-	7,326	371	548	**10,512**	-	2,201	3,808	4,777	2,700	150	331	**13,968**	**22,524**
FY11	-	-	2,231	33	-	-	5,566	380	-	**8,209**	-	1,111	1,268	3,343	2,700	273	621	**9,315**	**21,418**
FY12	-	-	2,231	36	-	-	6,909	371	187	**9,733**	-	2,478	1,710	3,293	2,700	273	492	**10,947**	**20,205**
FY13	-	-	-	-	-	-	6,791	406	280	**7,477**	-	1,339	-	5,216	2,700	219	309	**9,783**	**17,898**
FY14	-	-	-	7	-	-	4,770	395	49	**5,221**	-	-	1,585	4,907	2,800	214	322	**9,829**	**13,290**
FY15	-	-	-	12	-	-	4,496	145	36	**4,689**	-	-	1,792	3,293	2,800	247	268	**8,400**	**9,579**
FY16	-	-	-	10	-	-	4,975	108	67	**5,160**	-	-	1,749	3,293	2,800	240	196	**8,278**	**6,461**
FY17	-	-	-	-	-	-	3,449	64	-	**3,513**	-	-	-	3,293	2,800	223	151	**6,467**	**3,506**
FY18	-	-	-	-	-	-	1,031	108	-	**1,140**	-	-	-	-	2,800	223	65	**3,087**	**1,559**
FY19	-	-	-	-	-	-	-	2	-	**2**	-	-	-	-	1,489	19	-	**1,508**	**53**

Header Legend:

Influents	F-Canyon H-Canyon	Canyon influent projections based on WSRC Nuclear Materials Stabilization and Storage Vision 2006 Roadmap Stretch Case. F-Canyon shutdown flushes are included in the projections. The forecast is current as of September 2002.
	DWPF Recycle	Recycle rates depends on number of canisters produced and whether DWPF is processing sludge only or processing precipitate and sludge combined.
	299-H	Decontamination flush rates for the repair facility depend on evaporator operations. Typical rate is 12 kgal/year for each evaporator-year of operation. Some outyear production is assumed to be curtailed as the program life comes to a close.
	RBOF	The receiving basin for offsite fuel is expected to send 120 kgal/year through FY04
	ETF	After FY02, ETF evaporator effluents are assumed to be sent directly to Saltstone and are not included in the volume balance tabulation.
	Inhibited Water	Inhibited water additions include ESP wash water, salt dissolution water, tank wash water, and flushes.
	Jet Dilution	Steam eductor jets are used to transfer liquid waste from tank-to-tank. Volume from the transfer steam accounts for 4% of the mass being transferred for intra-area transfers and 12% for inter-area lines.
	Other	During some sludge slurrying operations, the slurry volume tends to expand (i.e. becomes less dense). This expansion is accounted for in the volume balance.
Effluents	Space Recovered by Evaporation	Volume is recovered by evaporating dilute liquid waste. Evaporation removes excess water (thereby reducing volume) and does not eliminate waste mass.
	Salt Solution to Saltstone	Decontaminated (or low Curie) salt solution sent to the Saltstone Facility from Tank 50 is included in this volume balance. Saltstone also accepts receipts directly from the ETF evaporators and from the Salt Waste Processing Facility and is not included in this tabulation.
	Salt Solution to Processing	High Curie salt solution adjusted to a sodium molarity of 6.44 is sent to the Salt Waste Processing Facility.
	Sludge Volume	Sludge slurry is sent directly to DWPF for vitrification.
	Other	This column accounts for other volume changes during the processing of waste. Mixing waste forms of different compositions are not mathematically additive. For example, noticeable space recovery can be achieved when a light solution (such as DWPF recycle water) is mixed with concentrated supernate. Also, the dissolution of "dry salt" (i.e. salt with interstitial liquid removed) tends to recovers space. Years with large amounts of salt dissolution reflect this anomaly.

Appendix D – Salt Solution Processing

End of Fiscal Year	Total Salt Solution from Tank Farms (kgal)	Salt Solution processed via Low Curie (kgal)	Salt Solution processed via Actinide Removal (kgal)	Salt Solution processed via Salt Waste Processing Facility (kgal)	Feed Stream to Saltstone (kgal)	ETF to Saltstone (kgal)	Grout Produced (kgal)	Vault Number
FY02						237	419	4
FY03	2,000	2,000	0	0	2,000	780	4,921	4
FY04	4,000	4,000	0	0	4,000	180	7,399	4
FY05	5,563	5,194	369	0	5,584	180	10,203	4
FY06	5,400	4,400	1,000	0	5,774	180	10,539	2
FY07	5,611	3,611	2,000	0	5,700	180	10,408	2
FY08	3,464	1,264	2,200	0	4,618	180	8,492	3
FY09	6,900	2,500	2,200	2,200	7,569	180	13,715	3
FY10	6,797	1,897	2,200	2,700	8,287	180	14,986	5
FY11	4,900	0	2,200	2,700	6,853	180	12,448	6
FY12	5,300	0	2,600	2,700	6,803	180	12,360	6
FY13	7,697	2,397	2,600	2,700	8,726	180	15,763	7
FY14	6,541	1,141	2,600	2,800	8,547	180	15,448	8
FY15	5,400	0	2,600	2,800	6,933	180	12,591	8
FY16	5,400	0	2,600	2,800	6,933	180	12,591	9
FY17	5,400	0	2,600	2,800	6,933	180	12,591	9
FY18	2,800	0	0	2,800	3,640	180	6,761	10
FY19	1,489	0	0	1,489	1,936	180	3,746	10
FY20	0	0	0	0	0	180	319	10
Total	**84,662**	**28,403**	**27,769**	**28,489**	**100,837**	**4,077**	**185,697**	**10**

Notes:

1 FY02 ETF to Saltstone represents the recovery of Tank 50 (Saltstone Feed Tank) for use as a Salt Processing Tank by transfering the entire contents to the Saltstone Facility.

2 Saltstone Vault ID numbers. With a permanent roof, each cell measures 98.5 x 98.5 x 25 feet = 242,500 cu-ft. Existing Vault #1 has 6 cells, of which 3.5 are filled; it will not receive any more feed. Vault #4 has 12 cells, of which 1 is filled. New vaults will have 12 cells each. Vault # fill sequence to be 4, 2, 3, 5, 6, 7, ... etc.

3 Each gallon of feed, when added to the cement, flyash, and slag makes 1.77 gallons of grout. Each cell is estimated to contain 1,814 kgal of grout. Therefore each cell holds 1,025 kgal of feed solution.

4 During the period between FY08 and FY15, some years exceed the rated capacity of salt waste processing of 6 million gallons per year. The average during this period however is less than the rated capacity. For the years exceeding total capacity (FY09, FY10, FY13, and FY14), low curie salt was being run at a higher rate to maintain production goals. SWPF-intensive programs such as high curie and ARP do not exceed their rated capacities.

Appendix E – Sludge Processing (PMP Case)

	Waste Removal		ESP Pretreatment							DWPF Vitrification						
A Sludge Batch	B Source Tanks	C Sludge Content (kg)	D Feed Prep Start Date	E Feed Prep Total Dur. (months)	F Total ESP Water Vol. (kgal)	G Na (wt% dry)	H Hg (wt% dry)	I Total Solids (wt%)	J Pretreated Volume (kgal)	K Feed Volume (kgal)	L Start Feed	M Canister Yield	N Feed Duration (years)	O Finish Feed	P Feed Tank	Q Sludge Loading (wt %)
1A	51	298,000			na	8.80		16.4	491	491	3/1/96	495	2.75	8/30/98	51	25.0
										-140	(Tk 51 heel @ 40 ")					
										351						
1B	42	420,861			na	7.77	0.30	16.5	460	460	10/1/98	726	2.96	12/1/01	51	25.0
	Total	**420,861**										(Included use of ~70 cans of Tank 51 heel)				
2	8	175,883			1,374	6.24	0.30	16.0	600	600	12/15/01	385	1.95	11/26/03	40	27.5
	40	261,867								-140						
	Total	**437,750**								460						
3	7 (70%)	288,957	12/1/02	12	1,544	6.24	0.07	16.0	379	379	11/26/03	320	1.39	4/16/05	51	36.0
	18 (70%)	16,076														
	Total	**305,033**														
4	7 (30%)	123,839	4/21/04	12	1,210	8.84	1.70	16.0	274	274	4/16/05	284	1.23	7/11/06	40	40.5
	11	124,380														
	18 (30%)	6,889														
	Total	**255,108**														
5	13 (50%)	208,780	7/16/05	12	2,756	8.82	1.33	16.0	520	520	7/11/06	421	1.83	5/9/08	51	39.8
	26	154,900														
	Total	**363,680**														
6	5	57,630	5/15/07	12	2,771	8.79	1.58	16.0	420	420	5/9/08	517	2.25	8/8/10	40	34.5
	6	38,708														
	13 (50%)	208,780														
	4	65,477														
	Total	**370,595**														
7	47	137,760	8/13/09	12	2,936	8.13	0.88	16.0	755	755	8/8/10	516	2.24	11/4/12	51	39.6
	34	74,119														
	33 (60%)	109,908														
	39	197,150														
	Total	**518,937**														
8	21	6,393	11/10/11	12	2,391	6.04	2.37	16.0	659	659	11/4/12	556	2.42	4/5/15	40	40.3
	22	13,265														
	23	59,110														
	33 (40%)	73,272														
	12	189,710														
	15	165,820														
	Total	**507,570**														

Appendix E – Sludge Processing (PMP Case)

	Waste Removal		ESP Pretreatment							DWPF Vitrification						
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
Sludge Batch	Source Tanks	Sludge Content (kg)	Feed Prep Start Date	Feed Prep Total Dur. (months)	Total ESP Water Vol. (kgal)	Na (wt% dry)	Hg (wt% dry)	Total Solids (wt%)	Pretreated Volume (kgal)	Feed Volume (kgal)	Start Feed	Canister Yield	Feed Duration (years)	Finish Feed	Feed Tank	Sludge Loading (wt %)
9	32	214,890	4/10/14	12	2,336	9.03	3.85	16.0	502	472	4/5/15	328	1.43	9/6/16	51	44.0
	43	173,700														
	Total	**388,590**														
10	ESP Heels (Tks 40,42,51)	158,377	9/12/15	12	1,163	11.29	5.05	16.0	482	482	9/6/16	512	2.23	11/28/18	40	49.4
	35	138,960														
	Other Insoluble Solids	219,000														
	Total	**516,337**														
Totals		**4,084,461**			**18,481**	**Total Estimated Washwater**						**5,060**	**Total Estimated Cans**			

Notes:

General: Above based on the following yearly canister production values: FY03-End 230/yr.

A) Each Sludge Batch must be individually tested and confirmed to meet waste qualification specifications

B) Sludge in these tanks will comprise the batch. Note: 100% of the sludge from Tanks 7 and 18 will be moved to ESP to support Sludge Batch 3. However, 30% of this sludge will be combined with Tank 11 sludge to make Sludge Batch 4.

C) Amount of sludge from each source tank in the batch obtained from WCS data base

D) Feed Prep start date is the date that sludge is first moved into the the ESP feed tank (40 or 51) to begin preparation of the sludge batch (i.e. obtain proper alkali composition of the sludge slurry for feed to DWPF)

E) Total planned duration of transfers, washing, sampling, test glass production, and associated decants for the preparation of a sludge batch for feed to DWPF

F) Total estimated volume of sludge transfer water and wash water decants to obtain target soluble Na concentration for feed to DWPF

G) Amount of total Na in washed sludge (dry basis)

H) Amount of total Hg in washed sludge (dry basis)

I) Total solids (soluble and insoluble) in washed sludge

J) Volume of sludge at given wt% total solids before heel effects (Batch 1B is actual. Batch 2 is projected from detailed analysis. Batch 3 and beyond are based on SpaceMan II results. This is the sludge volume plus no more than 18" of free supernate. If less supernate is shown in the model, then the total feed tank volume is reported.

K) Volume of sludge available for feed after adding or subtracting pump heel

L) Start feed date based on depletion of previous batch down to pump heel

M) Estimated number of discrete canisters produced given the pretreatment as shown. Numbers are actual for Batch 1A and 1B and estimated for remaining batches.

N) Column O divided by the planned canister production during the period in which the batch is vitrified. See production note under General Section above.

O) Column N plus column P. Finish Feed means when the last transfer of feed is sent from the Feed Tank. The last canister for the batch will be poured later. The DWPF has approximately 25 canisters of feed in process. Therefore 25 more canisters will be produced from the batch after the last feed is sent to DWPF.

P) Batch feed tank

Q) Weight % of glass comprised of sludge oxides.

Appendix F - Canister Storage

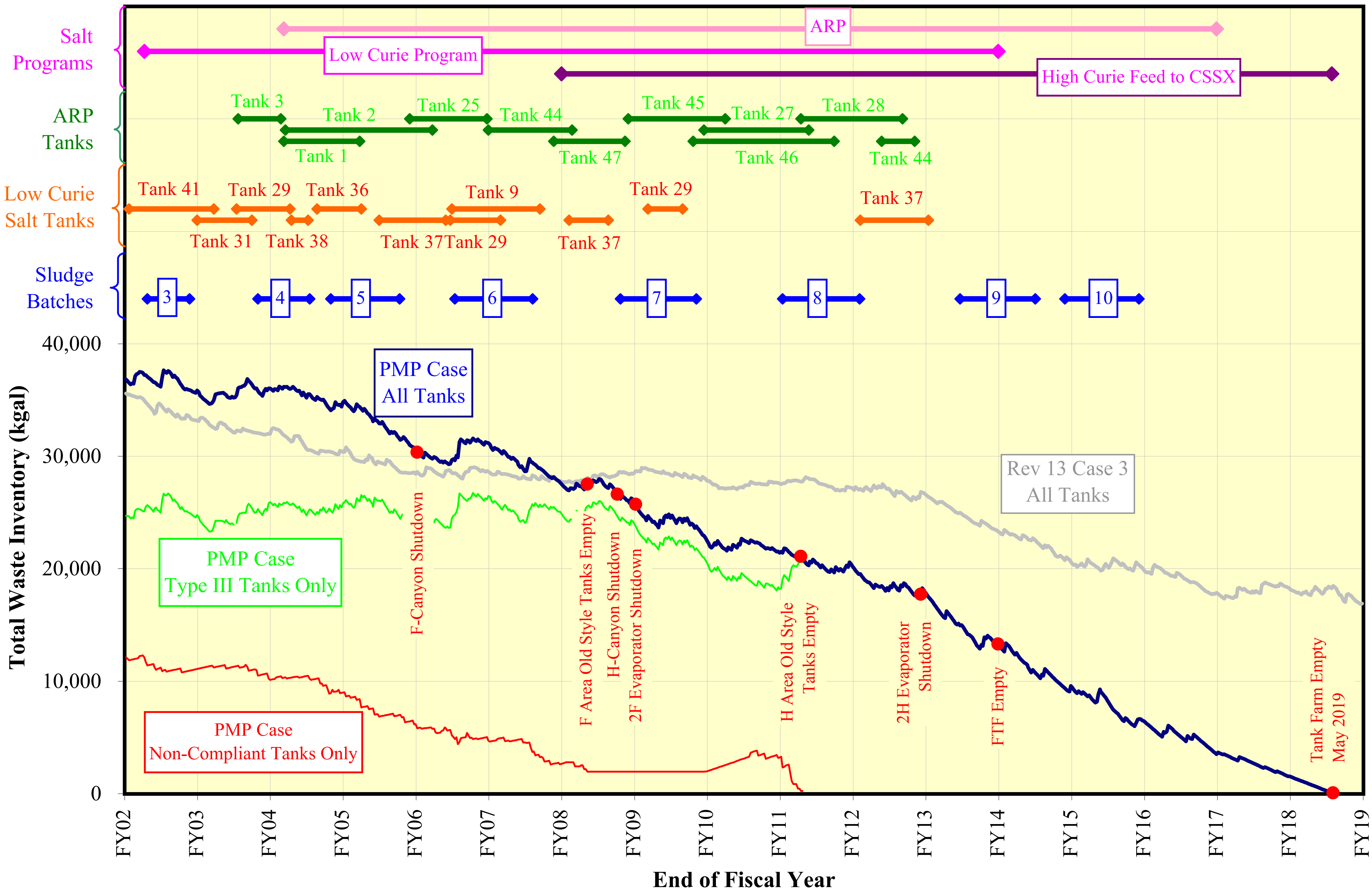
End of FY	SRS Cans Produced		SRS Cans in GWSB #1 (2,159 max)			SRS Cans in GWSB #2 (2,286 max)			SRS Cans Shipped to Repository		Net Cans Stored At SRS
	Yearly	Cum.	Added	Shipped	Cum.	Added	Shipped	Cum.	Each Year	Cumulative	
1996	64	64	64		64						64
1997	169	233	169		233						233
1998	250	483	250		483						483
1999	236	719	236		719						719
2000	231	950	231		950						950
2001	227	1,177	227		1,177						1,177
2002	160	1,337	160		1,337						1,337
2003	230	1,567	230		1,567						1,567
2004	230	1,797	230		1,797						1,797
2005	230	2,027	230		2,027						2,027
2006	230	2,257	132		2,159	98		98			2,257
2007	230	2,487			2,159	230		328			2,487
2008	230	2,717			2,159	230		558			2,717
2009	230	2,947			2,159	230		788			2,947
2010	230	3,177		(250)	1,909	230		1,018	250	250	2,927
2011	230	3,407		(500)	1,409	230		1,248	500	750	2,657
2012	230	3,637		(500)	909	230		1,478	500	1,250	2,387
2013	230	3,867		(500)	409	230		1,708	500	1,750	2,117
2014	230	4,097		(409)		230	(91)	1,847	500	2,250	1,847
2015	230	4,327				230	(500)	1,577	500	2,750	1,577
2016	230	4,557				230	(500)	1,307	500	3,250	1,307
2017	230	4,787				230	(500)	1,037	500	3,750	1,037
2018	230	5,017				230	(500)	767	500	4,250	767
2019	43	5,060				43	(500)	310	500	4,750	310
2020		5,060					(310)		310	5,060	
2021		5,060								5,060	

Notes:

1) GWSB #1 filling began in May 1996. Of its 2,286 canister storage locations, 5 positions store non-radioactive test canisters and 122 are unuseable with no viable repair technique. This yields a capacity of 2,159 usable storage locations, including 450 presently unusable locations

2) GWSB #1 is expected to reach maximum capacity in FY06.
3) A second building, GWSB #2, will be needed in FY06. The canister storage capacity will be identical to GWSB #1.
4) This Plan assumes that canisters can be transported to the Federal Repository starting in FY10 at a rate of 500 canisters/yr until the end of the program.
5) A canister load-out facility will be required to move the canisters from the GWSBs to a railcar. Assume one year for design (FY07) and three years for construction (FY08-10).
6) GWSB #1 will be emptied and available for D&D in FY15
7) GWSB #2 will be emptied and available for D&D in FY21.
8) The Plan does not include additional locations in GWSB #2 for spent fuels materials. The addition of these materials could require additional buildings.

Appendix G – Waste Processing Summary



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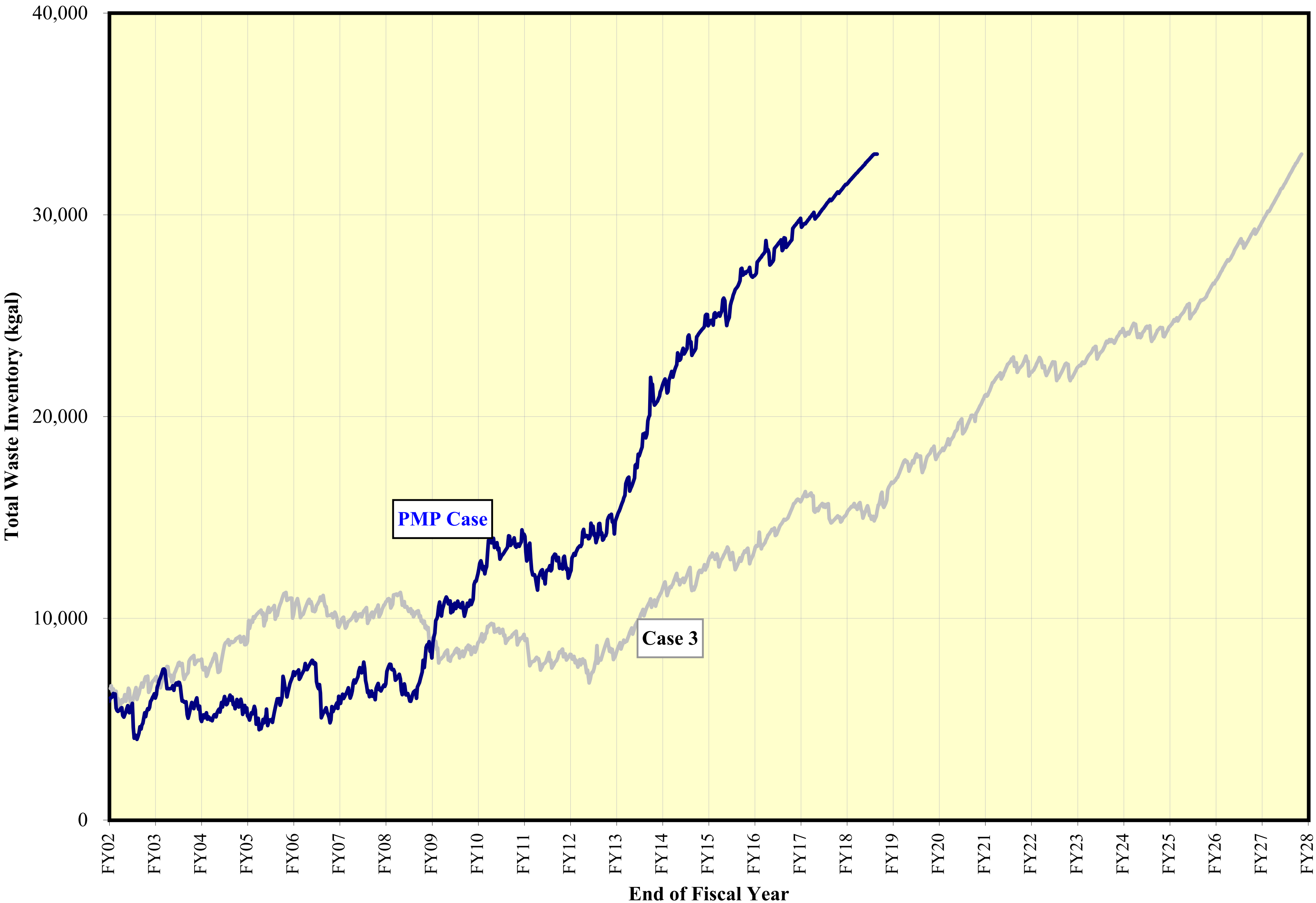
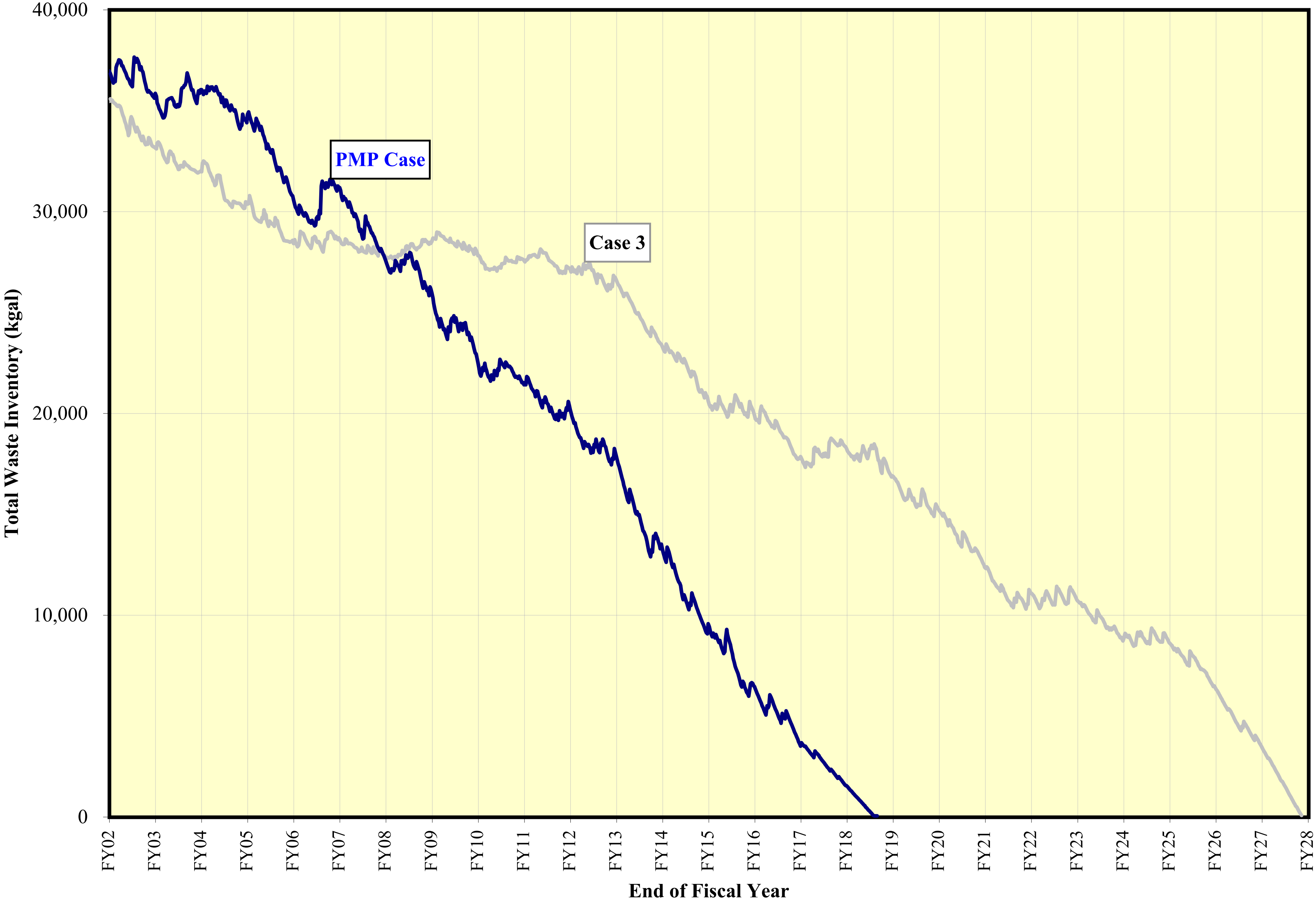
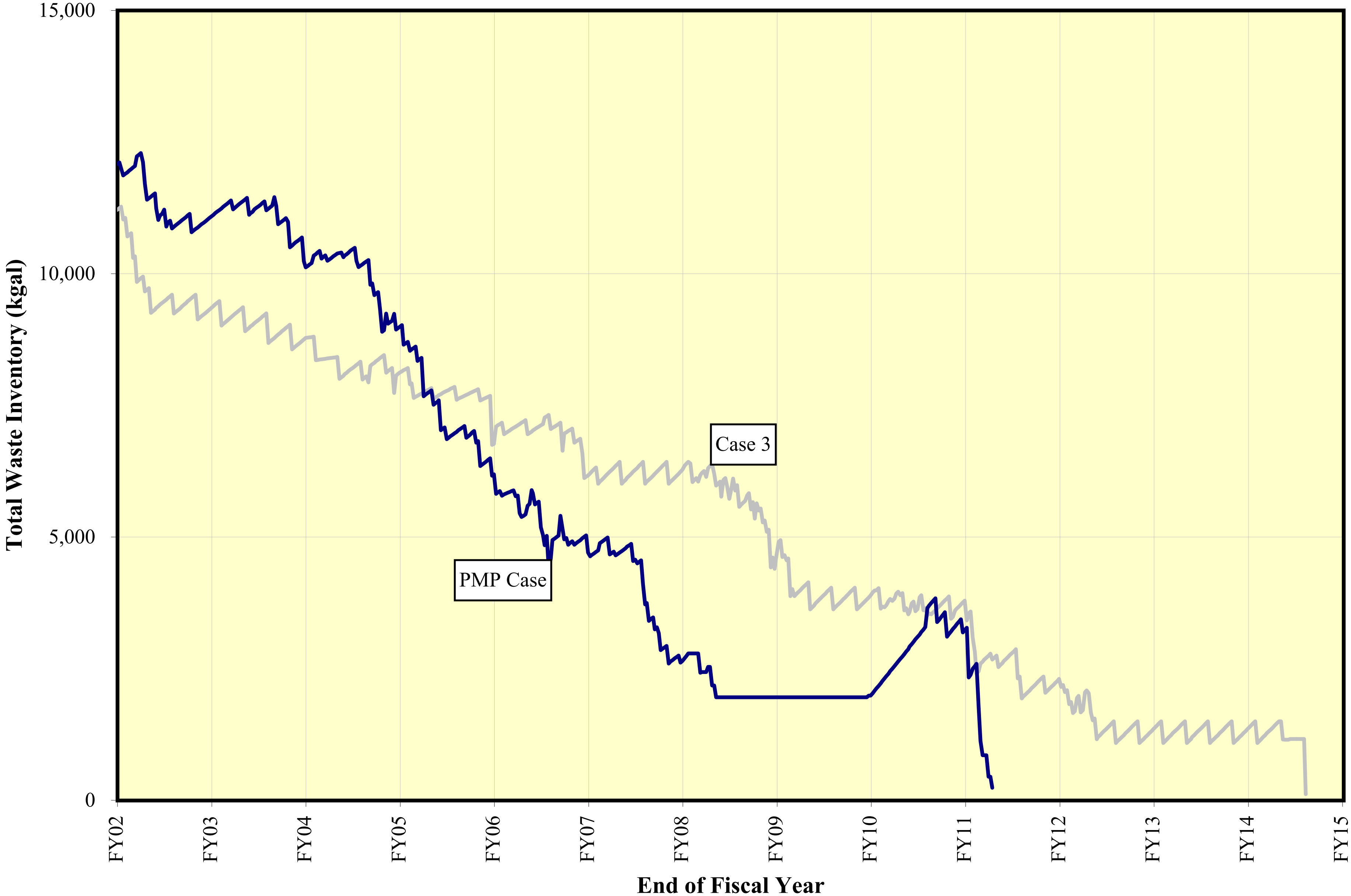
Appendix H – Useable Type III Tank Space



Appendix I – Remaining Tank Inventory

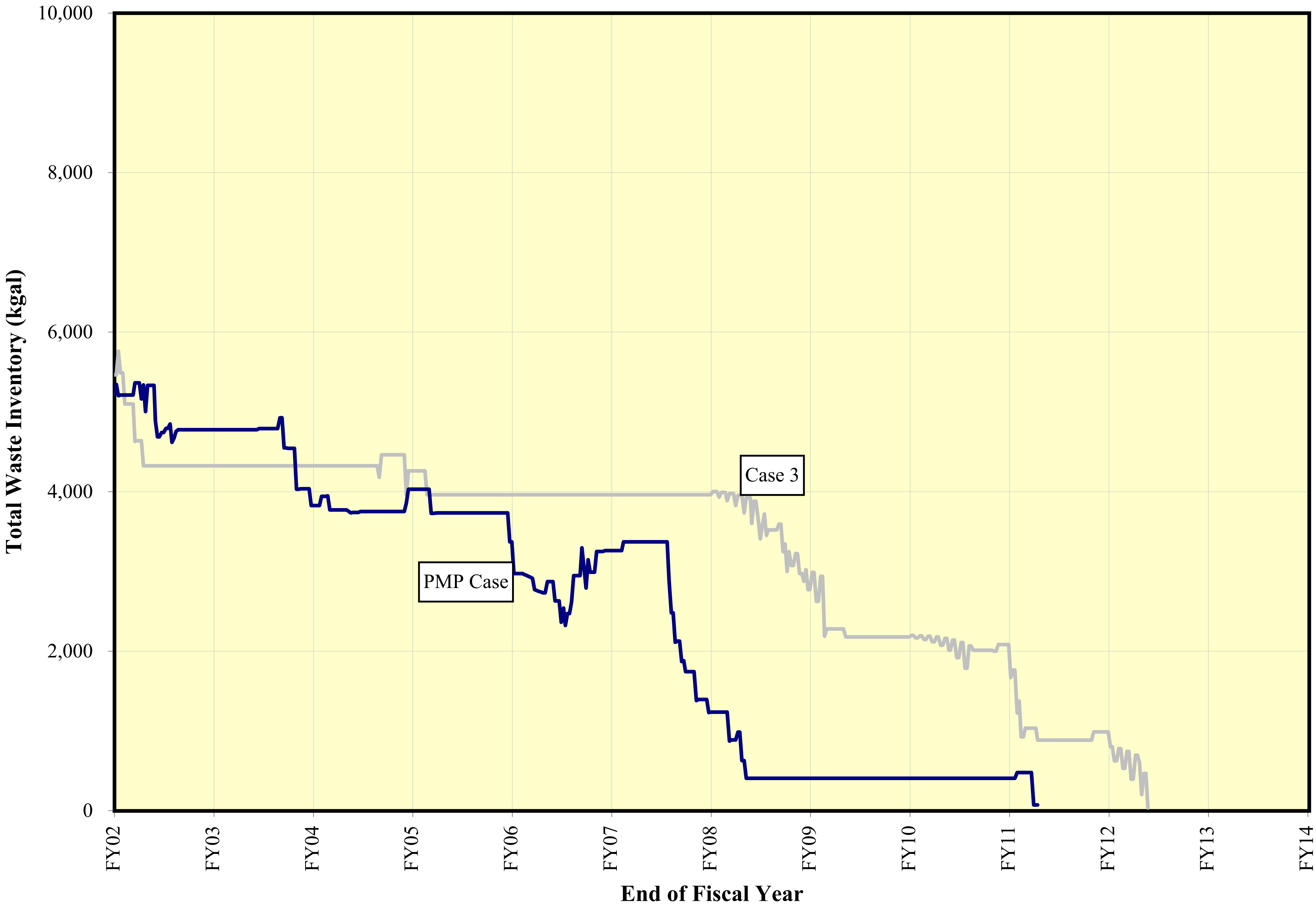


Appendix J – Remaining Inventory on Non-Compliant Tanks

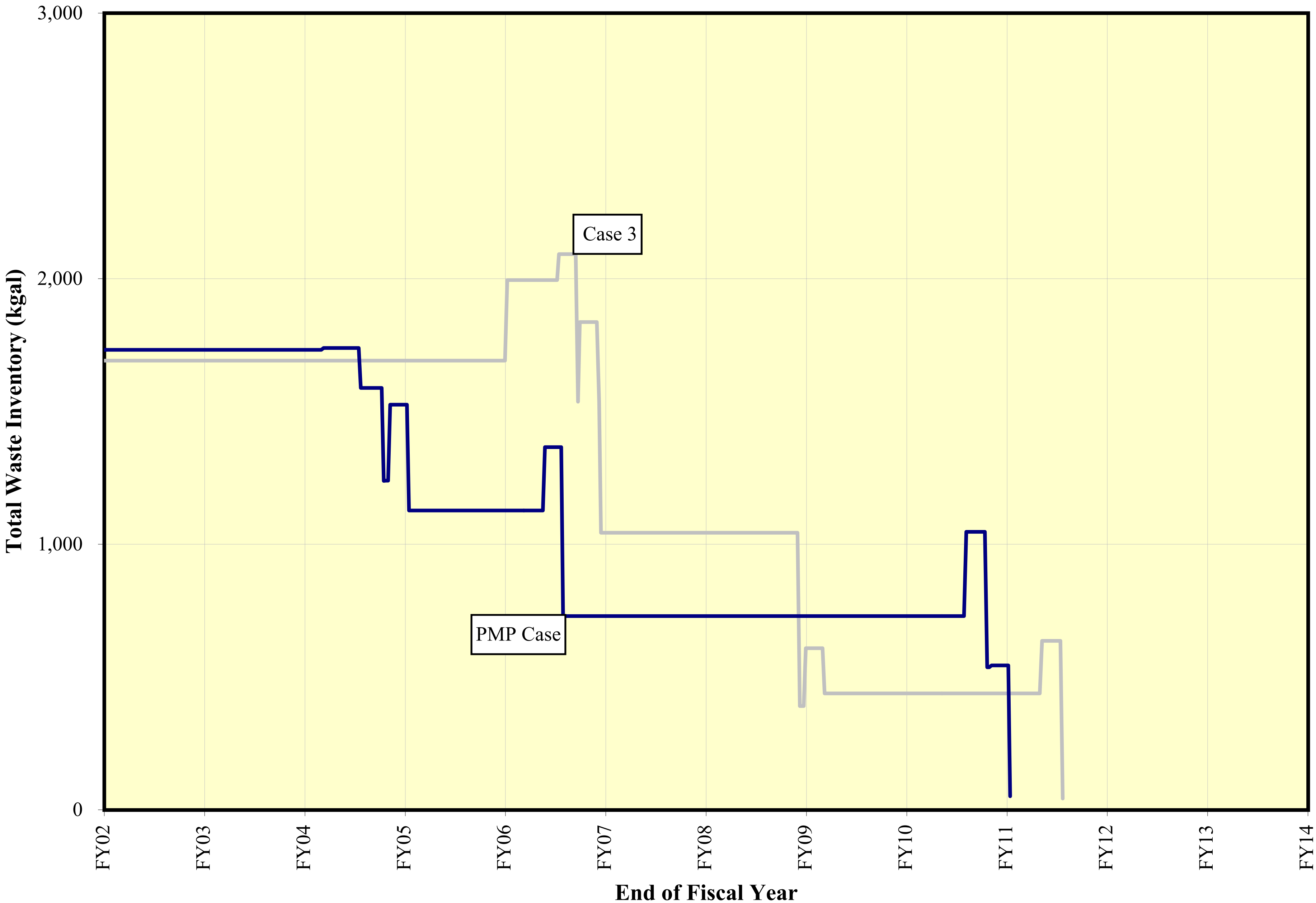


J.

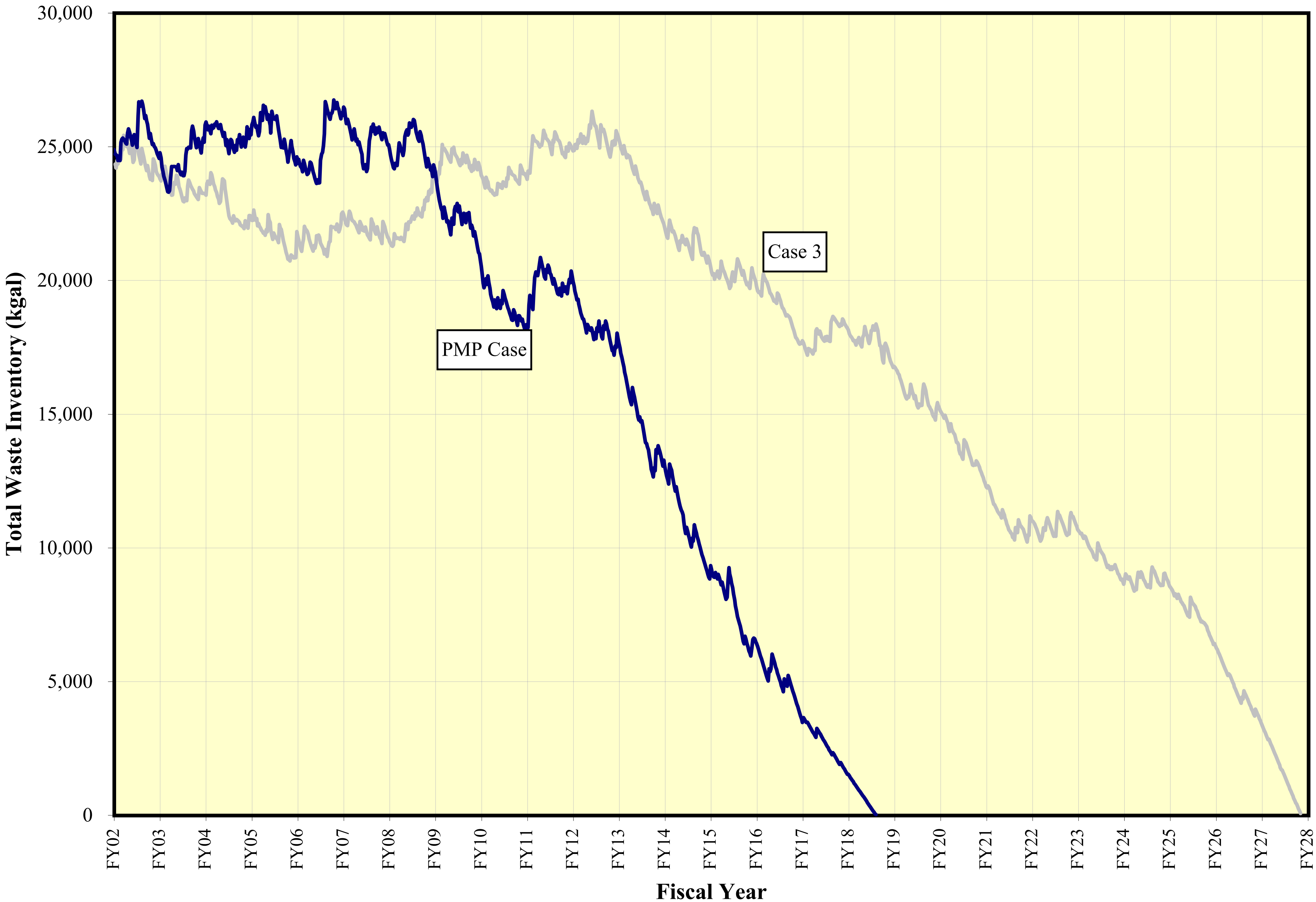
Appendix K – Remaining Inventory in Type I Tanks



Appendix L – Remaining Inventory in Type II Tanks



Appendix M – Remaining Inventory in Type III Tanks



Appendix N – Remaining Inventory in Type IV Tanks